National Convective Weather Forecast (NCWF)
Product Description Document (PDD)
Version 2

Part I - Mission Connection

Product Description:

The NCWF is algorithm that automatically produces diagnostic and forecast fields of hazardous convection over the conterminous United States and adjacent coastal waters (CONUS). Version 2 of the NCWF includes the information contained in the version 1 plus probabilistic 30-, 60-, 90- and 120-minute forecasts of convective hazard areas. The introduction of new science in version 2 has improved the convective hazard forecast accuracy.

One part of the NCWF, the National Convective Hazard Detection (NCHD) diagnostic, is generated from a combination of vertically integrated liquid (VIL) and echo top mosaics from the National Weather Service (NWS) WSR-88D national radar network, and lightning information from the National Lightning Detection Network.

Purpose/Intended Use:

The NCWF is intended to be a supplement to and not as a substitute for the Convective SIGMETs or other SIGMETs for convection. The Federal Aviation Administration (FAA) has authorized the NCWF for use by operational meteorologists and trained dispatchers only. The NCWF is useful for assisting dispatchers and traffic flow managers in their planning and provide greater efficiency during periods of convective weather within the National Airspace System (NAS).

For the first time the concept of probability the concept of probability has been introduces into the NCWF. This is the risk that hazardous convection will affect an area at a specific place and time with the airspace. Therefore, it is important that users understand how to use probabilistic forecasts. When the NCWF is used in conjunction with the Collaborative Convective Forecast Product (CCFP) convection forecasts are available every 5-minutes from the current time out to 4-6 hours.

Audience

The target users for NCWF are airline dispatchers, the general aviation community, and FAA Traffic Management Units (TMU).

Presentation Format

The NCHD portion of the NCWF on a 6 level intensity scale, corresponding to Video Integrator and Processor (VIP) levels used to indicate rainfall rates (Figure 1).
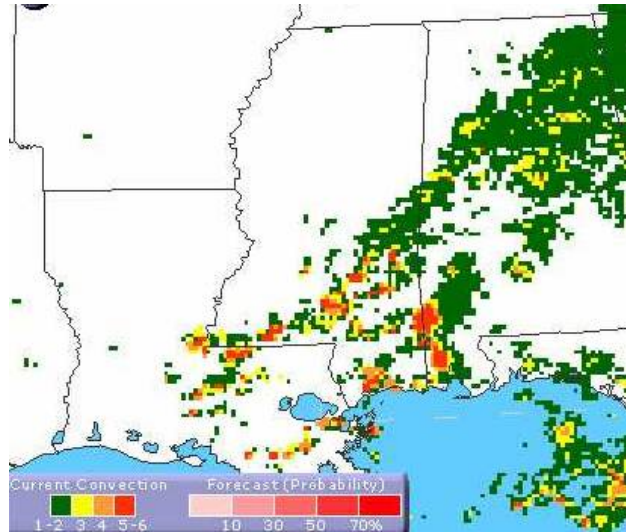
Figure 1: Example of NCWD output

The NCWF output is primarily in gridded binary (GRIB) format. One output field is in the binary universal for the representation of meteorological data (BUFR). NCWF output includes:

(1) 30 minute convective probability forecast (GRIB)
(2) 60 minute convective probability forecast (GRIB)
(3) 90 minute convective probability forecast (GRIB)
(4) 120 minute convective probability forecast (GRIB)
(5) 00 to 120 minute storm motion vectors (u and v components) (GRIB)
(6) 00 minute base level interest field (detection field) (NCWD) (GRIB)
(7) 00 minute low/high level interest field mask (GRIB)
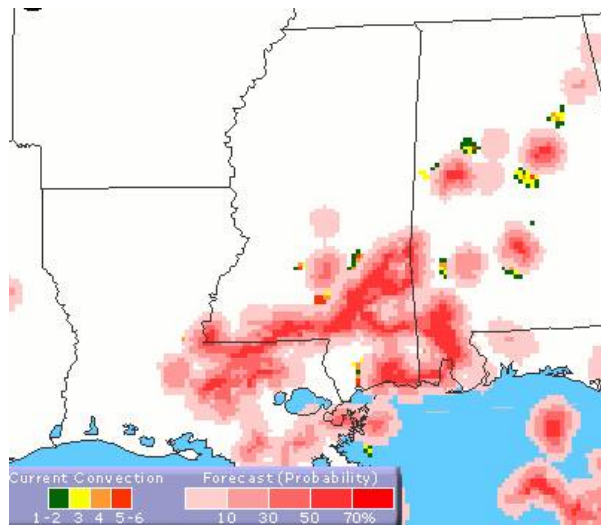(8) 00 and 60 minute forecast polygons and arrows (NCWF version 1) (BUFR)

Figure 2. Example of probability output

While experimental, the NCWF output will be available at http://www.weather.aero/convection/.

The operational version will be available at http://adds.aviationweather.gov/convection after 3 April 2007.

Feedback Method

The National Weather Service is always seeking to improve product quality by continuously soliciting user feedback. Comments regarding the NCWF may be sent though the "Feedback" link located in lower portion of the left-hand column of the operational NCWF webpage at http://adds.aviationweather.gov/convection.

You may also send comments to:

National Weather Service
Attn: Clinton Wallace, Aviation Support Branch Chief
Aviation Weather Center
Phone: (816) 584-7248
Email: Clinton.Wallace@noaa.gov

Part II - Technical Description

Format and Science Basis

The NCWF system produces 30-, 60-, 90- and 120-minute probabilistic forecasts are every 5 minutes. The frequent update cycle is used to reflect the rapidly changing nature of thunderstorms which evolve over very short time scales (order 30 min). The goal of this system is to continuously provide the most up-to-date information on convective activity across the CONUS for aviation users including aviation weather forecasters, airline dispatchers, general aviation, FAA Traffic Management Units and Center Weather Service Units.

Forecasts are produced through the following sequence of steps: 1) detection; 2) motion determination; (3) trending; (4) extrapolation; (5) conversion to probabilities; (6) dissemination; and (7) display.

Forecast areas are determined by applying a stratiform-convective partitioner (Steiner et al. 1985) and an elliptical filter (Wolfson et al. 1998) to the hazard detection field. These filters eliminate stratiform return that do not pose a hazard to en route aviation traffic and small-scale perishable features that are not likely to persist for more than an 1 hour, respectively. Extrapolations are performed using a combination of the Thunderstorm Identification Tracking and Nowcasting (TITAN) software developed by Dixon and Wiener (1993) and RUC steering level winds. The NCWF forecast product does well with long-lived mature systems. While NCWF does not explicitly treat storm initiation, the growth algorithms will capture new storm formation in the vicinity of existing storms. Work on improving automated methods for forecast initiation, growth and dissipation of storms and extending these forecasts to longer lead times through blending with probabilistic NWP forecasts is ongoing.

Improvements to NCWF version 2 include:

a) forecasts for smaller storms
b) motion vectors for storms greater than 512 sq km and have a history of at least 30 minutes
c) decreased delays in identifying developing storms that have little or no storm history
d) mitigation of forecasts "popping in and out" when the storm area is close to the 512 sq km threshold
e) improved storm motion tracking
f) trending of dissipation now based on grids to allow large storm systems to be dissipated in one region and grown in another

<u>Availability</u>

The NCWF is updated every 5 minutes and is based on the most current radar and lightning data. Available data is normally less than 5 minutes old when the product is created.